

# Jesup's Milk-Vetch

(*Astragalus robbinsii* var. *jesupi*)



## Recovery Plan



Prepared by  
Region Five  
U.S. Fish and Wildlife Service



JESUP'S MILK-VETCH

RECOVERY PLAN

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#### DISCLAIMER

This report is the Jesup's milk-vetch (Astragalus robbinsii var. jesupi) recovery plan. It has been prepared by the New Hampshire Natural Heritage Inventory under contract with Region 5 of the U.S. Fish and Wildlife Service to delineate reasonable actions required to recover and/or protect the species. It does not necessarily represent the views nor the official positions or approvals of any individuals or agencies, other than the U.S. Fish and Wildlife Service, involved in the plan formulation. This proposal is subject to modification as dictated by new findings, changes in species status, and the completion of recovery tasks. Goals and objectives will be attained and funds expended contingent upon appropriations, priorities and other budgetary constraints.

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## PART I - INTRODUCTION

Astragalus robbinsii (Oakes) Gray var. jesupi Eggleston and Sheldon (Jesup's milk-vetch), a member of the pea family (Fabaceae), has long been recognized as one of the rarest plants in New England (Crow, 1982; Countryman, 1978; Storcks & Crow, 1978). It was listed as endangered under the Endangered Species Act, as amended, on June 5, 1987 (Federal Register Vol. 52, No. 108, pp. 21481 - 21484). The reader should refer to this rule for details about the plant.

The entire number of individual plants of Jesup's milk-vetch is less than 1,000, a situation that could easily lead to the extinction of the taxon. Since its listing, the Jesup's milk-vetch has been given a Recovery Priority ranking of 9 based on a moderate degree of threat to existing populations and possibly high recovery potential.

### A. Description and Taxonomy

Astragalus robbinsii var. jesupi is a perennial herb, 2 dm to 6 dm tall, with pinnately compound leaves divided into 9 to 17 oblong to elliptic leaflets 1 cm to 2 cm long. The bluish-violet flowers appear in late May or early June. The diagnostic seed pod is 1.5 cm to 3.0 cm long (Figure 1) and has a conspicuous beak.



FIGURE 1. Astragalus robbinsii var. iesupi (Jesup's milk-vetch)  
Reprinted from *New England's Rare, Threatened, and  
Endangered Plants*. Crow, G.E. 1982. Habit X1; fruit  
cluster X1; single fruit X3. Illustration by Tess Feltes.

Jesup's milk-vetch was first collected in 1877 at Summer Falls in Plainfield, New Hampshire by Professor Henry Griswold Jesup of Dartmouth College. It was subsequently described by Eggleston and Sheldon in 1894 in the Bulletin of Geological and Natural History Survey of Minnesota. Several specimens were collected from Hartland, Vermont on June 7, 1891, and one of these specimens, deposited at the University of Minnesota, was designated as the type specimen. There are also a plethora of specimens collected from Hartland in May 1894 that were distributed by Eggleston as "types" which are, in fact, only from the type station.

At present, Astragalus robbinsii is treated as a collective species (Barneby, 1964; Kartesz and Kartesz, 1980) with two main areas of distribution: a western Cordilleran section (Colorado to eastern Alaska) and a New England-eastern Canadian section. In each area, there are three "virtually monomorphic and probably genetically fixed varieties confined to a narrow ecological niche" (Barneby, 1964). One additional variety, var. minor, is found in both areas.

The eastern components of Astragalus robbinsii comprise:

- 1) var. robbinsii, known only from limestone ledges of the Winooski River in Vermont prior to 1894 and considered extinct. Mention of Astragalus robbinsii in recent Canadian publications such as "The Rare Vascular Plants of Nova Scotia" and "The Rare Vascular Plants of British Columbia" apparently refers to var. minor (K. Pryor, personal communication);

- 2) var. fernaldii, found in coastal areas of southern Labrador and adjoining Newfoundland and Quebec;
  
- 3) var. minor, found on mountains and riversides of Vermont, New Hampshire and coastal Nova Scotia. This taxon has also been known as var. blakei (Eggl.) Barneby;
  
- 4) var. jesupi, endemic on rock outcrops along the Connecticut River in Vermont and New Hampshire and the subject of this recovery plan. This taxon has also been known as Astragalus jesupi (Eggl. and Sheld.) Britton and Atelophragma jesupi (Eggl. and Sheld.) Rydberg. In this plan, the taxon Astragalus robbinsii var. jesupi is termed a "species", as defined in the Endangered Species Act of 1973, as amended.

B. Distribution and Status

The total distribution of Jesup's milk-vetch is confined to three sites on the banks of the Connecticut River within a stretch of 16 miles (25 kilometers) (Figure 1). Two of the sites are in New Hampshire and one is in Vermont. Of these three extant populations, one is extremely small (Table 1). An additional population of four plants did persist for a while on a silty riverbank on the Vermont side of Summer Falls, but the station was destroyed by floods between the 1984 and 1985 field season.



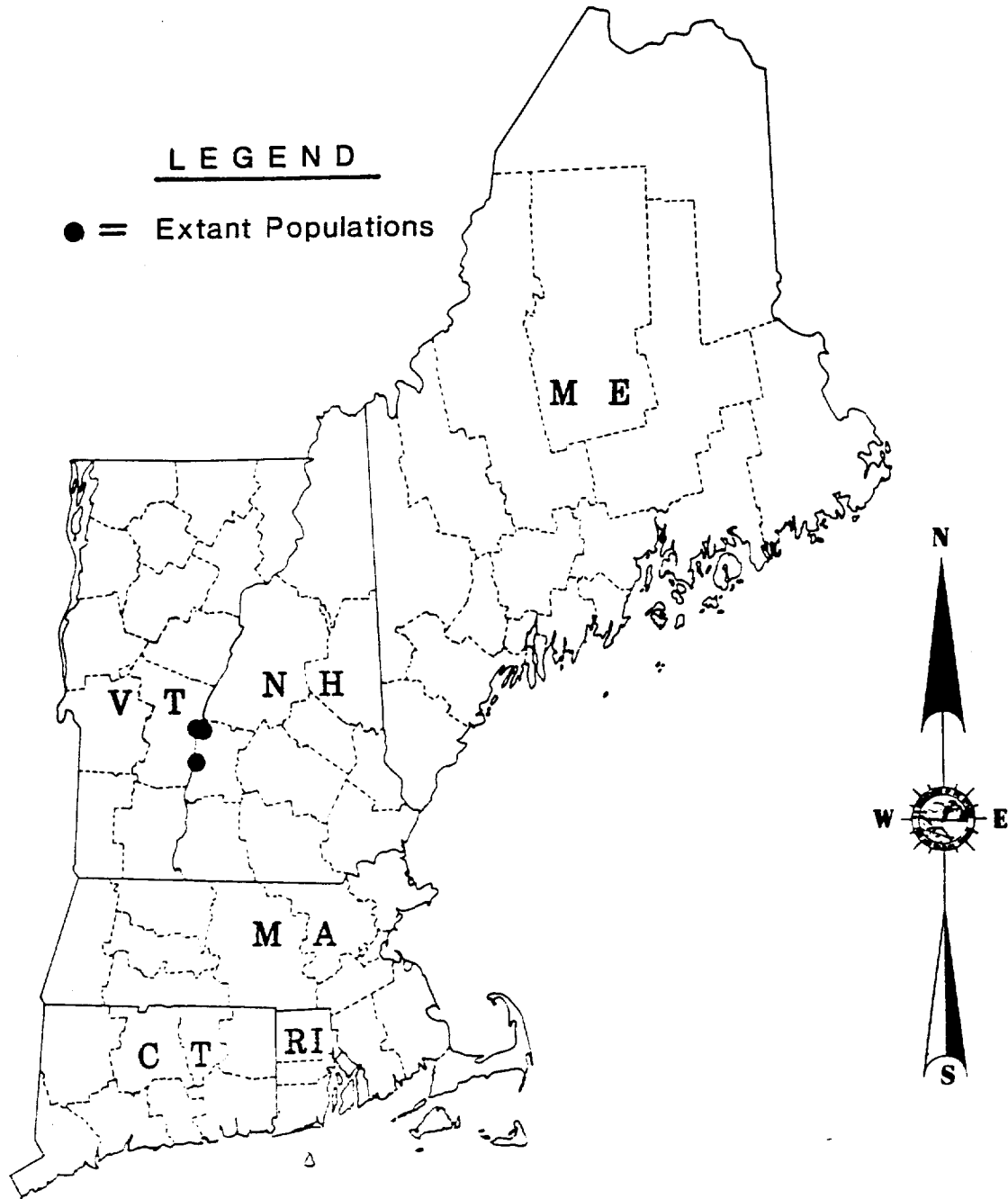


FIGURE 2. Distribution of Known Populations of *Astragalus robbinsii* var. *jesupi* (Jesup's milk-vetch).

TABLE 1. Summary of known populations of Astragalus robbinsii var. jesupi

<u>STATE</u>	<u>COUNTY</u>	<u>TOWN</u>	<u>COMMENTS</u>
VT	Windsor	Hartland	type locality, known since 1881, apparently fluctuates from 200 to 500 plants
NH	Sullivan	Plainfield	known since 1877, small population apparently fluctuates from 6 to 50 plants
NH	Sullivan	Claremont	known since 1956, numbers apparently fluctuate from 100 to several hundred

Aerial surveys by the New Hampshire Natural Heritage Inventory (New Hampshire Department of Resources and Economic Development) and the Vermont Natural Heritage Program (Vermont Agency of Natural Resources) revealed a number of sites with potentially suitable habitat for Astragalus robbinsii var. jesupi. Most of the sites were located between Comerford Dam in Monroe, New Hampshire and the Massachusetts border. Field searches have been made at a majority of those sites but no new populations have been found to date.

### C. Habitat

As Barneby (1964) states, each variety of A. robbinsii is confined to a specific ecological niche. Information about the habitat requirements of Astragalus robbinsii var. jesupi is limited, but it is known that the species is found primarily on calcareous bedrock outcrops composed of chlorite or phyllite schist, which are ice-scoured annually. The majority of the plants occur at the ice-scour line which constitutes the ecotone

between barren rock and the vegetated upper areas of the bank. Usually, plants are found on ledges or shelves of the outcrop where a little soil or organic matter has accumulated. However, scattered plants of the Hartland, Vermont population have been found growing on more developed soil. It appears that plants in partial shade produce the most seed. The New Hampshire populations have a west-facing aspect, while the Vermont plants face east.

The stretch of river that supports Jesup's milk-vetch is also habitat for many other rare plants, animals and natural communities. The dwarf wedge mussel, Alasmidonta heterodon, a species proposed for Federal listing, is found in the water near two of the three sites for Astragalus robbinsii var. jesupi. A candidate species for Federal listing, the cobblestone tiger beetle (Cicindela marginipennis) is also known from the same area. In addition, 15 listed plants protected under the New Hampshire Native Plant Protection Act and four Vermont state rare plants occur in the same habitat with Astragalus robbinsii var. jesupi. Clearly, this 16-mile stretch of the Connecticut River contains some of the most significant natural areas of both states.

#### D. Ecology

The ecology of Jesup's milk-vetch is inextricably tied to the Connecticut River ecosystem. Every spring the outcrops on which the plants are found are scoured by ice, thus reducing competition by preventing invasion by woody species. Spring floods also deposit nutrient-rich sediments in the

rock crevices. The optimum environment for the species is believed to include conditions of partial shade. Partial shade is provided by trees and shrubs growing higher up on the bank above the scour/flood habitat in the two largest populations. A list of the species most commonly associated with Jesup's milk-vetch is provided in Table 2.

TABLE 2. Species most commonly associated with Jesup's milk-vetch

<u>Senecio pauperculus</u>	Ragwort
<u>Toxicodendron radicans</u>	Poison Ivy
<u>Poa compressa</u>	a grass
<u>Chrysanthemum leucanthemum</u>	Daisy
<u>Hypericum perforatum</u>	St. John's-wort
<u>Solidago canadensis</u>	Canada Goldenrod
<u>Campanula rotundifolia</u>	Harebell
<u>Erigeron pulchellus</u>	Fleabane
<u>Galium mollugo</u>	Bedstraw
<u>Alnus rugosa</u>	Alder
<u>Ulmus americana</u>	American elm
<u>Salix spp.</u>	Willows

#### E. Species Biology

Virtually nothing is known about the specific life history and pollination biology of this rare taxon. There are no known studies of the biology of the species, and there is a paucity of general information available in the literature. It is known that the plants usually blossom in late May to early July and seed is set in late June to mid-July (Fernald, 1950). The author has observed bumblebees (Bombus sp.) visiting the blossoms of Jesup's milk-vetch.

In 1986, 288 seeds of Astragalus robbinsii var. jesupi were collected for the Center for Plant Conservation, Jamaica Plain, Massachusetts. Of this number, 200 were mailed to the seed bank at the U.S. Department of Agriculture Plant Introduction Station at Washington State University in Pullman, Washington. William Brumback, the propagator for the New England Wildflower Society, attempted to germinate the remaining seeds. Unfortunately, germination rates were low and seedling mortality was ultimately one hundred percent (W. Brumback, personal communication). Brumback believes that he has acquired some knowledge of the factors that led to the demise of the plants, and hopes that another attempt to raise plants of Jesup's milk-vetch would result in greater success.

#### F. Threats

Habitat alteration and botanical collecting have been identified as the major threats to the continued existence of this species (Federal Register, 1985).

Any action resulting in alteration of the river ecosystem in the area under consideration constitutes a direct threat to the continued existence of Astragalus robbinsii var. jesupi. Foremost in this category of threats are hydropower projects that would inundate the area or otherwise change the water regime. In the recent past, two dams had been proposed for the stretch of river between Charlestown, New Hampshire and Plainfield, New Hampshire. Neither proposal is currently active and there appear to be no imminent threats to the populations from dam development.

The U.S. Army Corps' Cold Region Research and Engineering Laboratory (CORREL) has recently developed a method to control ice breakup of the Connecticut River to prevent ice damage to an historic bridge in Cornish, New Hampshire. The mechanism for artificially inducing ice break up is the release of a large volume of water from Wilder Dam under appropriate ice conditions. This sudden release of water creates a wave on the river, fracturing and moving the ice in its path downriver, below the Cornish-Windsor Bridge. When this process is implemented, the "breakup would occur earlier, and at a reduced stage and discharge than the natural event" (Ferrick et al, 1988). A field trial of this plan was conducted in the winter of 1989 within the area of two of the populations of Jesup's milk-vetch. The long-term consequences this method would hold for Jesup's milk-vetch are unknown at this time, but the possible implications must be considered before this process is adopted or further tested. CORREL has proposed an additional field trial for March, 1990.

In the past, many botanists collected large numbers of plant specimens and distributed (or sold) them to institutions. Today, there is an excessive number of botanical specimens of Jesup's milk-vetch deposited in various herbaria throughout the country. Until recently, Federally endangered plant species have not been protected from "taking" unless they occurred on Federal land. Since none of these populations are located on Federal land, they have not been afforded full protection under the Endangered Species Act. However, the 1988 amendment to the Act increases protection to species not on Federal land by making it illegal to destroy or remove an endangered plant if it is in knowing violation of a state endangered

species law. The New Hampshire Native Plant Protection Act prohibits the taking of listed species from private property without permission of the landowner and the Vermont Endangered Species Act prohibits all taking of endangered or threatened species (unless exempted). Jesup's milk-vetch is protected under both State laws.

Other potential threats include logging or other land use disturbances on the banks of the river above the sites, and habitat disturbance stemming from recreational activities (e.g. Sumner Falls).

G. Conservation Efforts

The Nature Conservancy, a national non-profit conservation organization, has contacted the owners of the three Jesup's milk-vetch sites and informed them of the ecological significance of their properties. To date, one owner has entered into a voluntary registry agreement with The Nature Conservancy. Registry agreements do not constitute permanent protection but are considered a first step in this process.

## PART II - RECOVERY

### A. Recovery Objectives

The primary, immediate objective for the Astragalus robbinsii var. jesupi recovery program at this time is to prevent extinction of the species by protecting and maintaining the three known populations and their essential habitat along the Connecticut River.

The secondary objective of the program is to increase the size of the total population of Jesup's milk-vetch to a level which will ensure long-term survival of the species. As a preliminary target, this population level is set at the location or establishment of 7 additional occurrences of Jesup's milk-vetch, with a range of 100 to 500 individual plants in each occurrence. Contingent upon availability of funds, the time frame for accomplishing this recovery target is 5-8 years.

As a means to reach these objectives, we need to identify a minimum viable population for Jesup's milk-vetch. Minimum viable population is defined as "a demographically stable population that is large enough to maintain sufficient genetic variation to enable it to evolve and respond to natural environmental variation" (U.S. Fish and Wildlife Service, 1989).

Based upon identification of a minimal viable population in conjunction with identification of available habitat, one of two determinations will be made: either the minimum viable population for reclassifying the plant from endangered to threatened will be identified, or -- if ascertained that not enough habitat exists to support a viable population -- it will be



determined that delisting or reclassification is not possible. In this case, the species will remain classified as endangered and will continue to receive the appropriate protection.

B. Narrative Outline for Recovery Actions to Address Threats

1. Protect Known Populations.

With only three sites known in the world for this species, it is vital that all these populations be fully and permanently protected. The sites, along with their primary and secondary ecological boundaries, are well delineated on maps maintained by the New Hampshire and Vermont Heritage Programs.

1.1 Seek Permanent Protection of Essential Habitat.

Permanent protection is a critical component of the recovery process. The Nature Conservancy has researched ownership of the known populations and has contacted the landowners of all three sites. One owner has entered into a voluntary registry agreement with The Nature Conservancy. Permanent protection of these habitats will be sought via conservation easements, direct acquisition, or other agreements with the remaining landowners.

1.2 Ensure Continuation of Present-day (Pre-1989) Dynamics of Any Portion of the River Ecosystem Directly Affecting Known Populations.

Any alteration of the natural processes of the Connecticut River in the particular stretches affecting known sites "would be a serious threat to the species' continued existence" (Federal Register, 1985).

Of specific concern in this regard is the U.S. Army Corps' experimentation with controlled ice breakup on the river. Because another year of controlled ice breakup is proposed, consultations to assure that further activities in this area do not adversely affect the Jesup's milk-vetch sites will be accomplished under the provisions of the Endangered Species Act, Sections 7 and 10.

### 1.3 Encourage Ongoing Cooperation Among Public Agencies and Private Conservation Groups to Protect Existing and Potential Habitat.

A coordinated effort among state and Federal agencies and private conservation groups will be instrumental in achieving full protection of the Jesup's milk-vetch sites. New Hampshire and Vermont have passed plant protection legislation and have Cooperative Agreements with the U.S. Fish and Wildlife Service, as provided for in Section 6 of the Endangered Species Act.

Preliminary applications for permits for dams at Hart Island and Chase Island have been filed in the past, before the Jesup's milk-vetch was listed. Both preliminary permit applications have either been surrendered or withdrawn. No imminent threat to the populations is expected due to dam construction. Should new preliminary permits be proposed, the U.S. Army Corps of Engineers and the Federal Energy Regulatory Commission (FERC) will need to consult with the Fish and Wildlife Service under Section 7 of the Endangered Species Act.

#### 1.4 Develop and Initiate Information and Education Activities.

In order to prevent inadvertent impacts on the populations, it is vital that information on the significance and vulnerability of Jesup's milk-vetch be disseminated to the appropriate private groups (such as the Connecticut River Watershed Council), regional groups (i.e., Regional Planning Commissions), the Soil Conservation Service, town Conservation Commissions, and others as necessary. This information could be made available through the two state Natural Heritage Programs. A special plea will be made to botanists asking their cooperation in protecting this species. This information could be distributed through various botanical journals and newsletters.

#### 2. Conduct Field Surveys to Locate Additional Populations.

Additional populations would improve the outlook for this species' continued existence. If other sites supporting Jesup's milk-vetch are located they will be protected as soon as possible.

##### 2.1 Continue Surveys in Pre-identified Areas.

Field surveys in areas pre-identified by New Hampshire and Vermont Heritage Programs between Comerford Dam and the Massachusetts border will continue.

##### 2.2 Expand the Survey Effort.

Federal, state, and private groups will make a concerted effort to locate additional sites for Astragalus robbinsii var. jesupi. Annual surveys will be conducted over a 2-week period and will expand in

scope to cover all outcrops along the banks of the entire Connecticut River in New Hampshire and Vermont, and the Connecticut River drainage system in both states. It may be that suitable habitat exists for Jesup's milk-vetch on outcrops along rivers flowing into the Connecticut.

3. Determine Habitat and Ecological Requirements for Maintaining Populations.

This information will be essential in assessing potential impacts to Jesup's milk-vetch from activities in the river corridor and in determining future recovery efforts.

3.1 Assess Habitat Requirements.

The bedrock substrate of each of the three known populations will be analyzed to ascertain its composition in order to help determine other suitable places for finding the species or, if necessary, establishing new populations. Quantitative studies measuring light intensity, degree of competition, etc., will be undertaken to better understand the habitat requirements of Jesup's milk-vetch.

3.2 Research the Role of River Ecosystems in Maintaining Populations.

A long-term monitoring program of the timing and degree of annual ice-scouring and flooding and their relationship to the size and reproductive success of the plant populations will be initiated. Incidental environmental parameters, such as the effect of shade and climatological variation, will also be tracked.

3.3 Assess Historical Dynamics of that Portion of the River Ecosystem Directly Affecting Populations.

Correlations between annual river level fluctuations and plant population levels need to be investigated as does the possible relationship between dam construction on the Connecticut River and the occurrence of Jesup's milk-vetch populations. An assessment of the historical dynamics will lead to a better understanding of historical plant population fluctuations and will assist in determining future management strategies.

3.4 Identify Available Habitat.

As field surveys are completed, areas with suitable environmental conditions for supporting populations of Astragalus robbinsii var. jesupi will be mapped and described. These areas will then be assessed to determine the total quantity of habitat available for establishment of additional populations, according to the habitat and ecological criteria identified in the preceding tasks. This task is contingent upon completion of Tasks 2.1 and 2.2.

4. Determine Biological Requirements for Maintaining a Minimum Viable Population.

Information about the biological requirements is necessary to assess the vulnerability of the species and provide empirical information for future recovery efforts.

#### 4.1 Monitor Existing Population Levels.

More information is needed on the absolute numbers of individual plants of Jesup's milk-vetch. The only information currently available on population levels are from the rough estimates on New Hampshire Natural Heritage and Vermont Natural Heritage Field forms for 1984 and 1986. These estimates appear to indicate a decline in the number of plants observed in New Hampshire. Recent (1988) joint field work of both programs indicates that the Hartland population has expanded. From these scant data, it appears that there is some fluctuation in the size of the populations, but long-term monitoring is necessary before any conclusions can be made. Permanent plots will be established and individual plants mapped.

#### 4.2 Conduct Detailed Demographic Studies.

An annual census of all individual plants should be carried out with each plant categorized as to age group, flowering and fruiting status, and other pertinent details.

#### 4.3 Conduct Life History Studies.

In order to address the management needs and recovery efforts of Jesup's milk-vetch, much more data on species biology are necessary. Phenology, pollination biology, seed development and dispersal, germination requirements, and the presence or absence of asexual reproduction are all unknown factors which need to be determined in order to implement recovery strategies.

#### 4.4 Determine a Minimum Viable Population.

The population growth rate, and age and reproductive structure within each of the three existing occurrences will be determined. This information, in conjunction with the demographic studies (Task 4.2) will be used to determine the minimum viable population.

#### 5. Develop and Implement Management Plans.

Once conservation easements, management rights, or direct acquisition of the Jesup's milk-vetch occurrences are in place, an interim policy regarding collection of plants and recreational uses/impacts shall be developed and implemented. It will be recommended that due to the small number of plants, the limited reproductive potential, and the limitation of available habitat, all botanical collecting be curtailed. The interim policy will be in effect until a long-term management policy, based on research of the population dynamics, life history, etc., is complete. Results from the biological and ecological studies of Tasks 2, 3 and 4 will be incorporated in the long-term recommended management actions for each known population. The effects of management will be carefully monitored.

#### 6. Establish New Populations.

For purposes of this task, "population" is defined as those plants present at a particular location, i.e. occurrence. The establishment of new occurrences, contingent on information gathered from population

studies and artificial propagation research, may be necessary to safeguard the species from unforeseen natural disasters and human impact.

#### 6.1 Propagate Seeds in a Controlled Situation

As warranted, a small percentage of seeds will be collected and propagated under the direction of the Center for Plant Conservation. This action will be taken only after data collected under Tasks 4 and 5 have been analyzed.

#### 6.2 Establish and Initiate Management of Additional Occurrences.

This task will be implemented after Tasks 3, 4.3, 5, and 6.1 have been successively completed and it is determined that additional occurrences are possible and/or warranted.



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PART III - IMPLEMENTATION SCHEDULE

The Implementation Schedule lists and ranks tasks that should be undertaken within the next three years in order to initiate recovery of Astragalus robbinsii var. jesupi. This schedule will be reviewed annually until the recovery objective is met, and priorities and tasks will be subject to revision. Tasks are presented in the order in which they will be undertaken.

A. Key to Implementation Schedule:

General Category (Column 1):

Information Gathering - I or R (Research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Competitor control

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Other - O

1. Information and education
2. Law enforcement
3. Regulations

5. Depradation control
6. Disease Control
7. Other management

Priority (Column 4):

1. Those actions that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
2. Those actions that must be taken to prevent a significant decline in species population, or some other significant negative impact short of extinction.
3. All other actions necessary to provide for full recovery of the species.

Agency Roles (Column 6):

- FWS - U.S. Fish and Wildlife Service, Region 5
- SA - State Agencies, including the New Hampshire Natural Heritage Inventory and the Vermont Natural Heritage Program
- PO - Private Organizations (The Nature Conservancy, Audubon, etc.)
- COE - Army Corps of Engineers

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B. IMPLEMENTATION SCHEDULE FOR JESUP'S MILK-VETCH

General Category	Task	#	Priority	Duration	Agencies	Cost (in thousands)					Comments
						FY1	FY2	FY3	FY4	FY5	
A-3 A-4 A-6	Protect essential habitat	1.1	1	2 yrs	FWS/SA/PO	5.0	5.0				Conservation easements, acquisition
O-3	Ensure continuation of river dynamics	1.2	1	2 yrs	FWS/COE/FERC	0.25	0.25				
O-1 O-3 A-3	Encourage cooperation among public and private agencies	1.3	3	ongoing	FWS/SA/PO	1.0	1.0	1.0	1.0	1.0	
O-1	Initiate information and education activities	1.4	3	ongoing	FWS/SA	2.0	1.0	1.0	1.0	1.0	
I-14	Continue current field surveys	2.1	2	5 yrs	FWS/SA	1.5	1.5	1.5	1.5	1.5	
I-14	Expand survey effort	2.2	2	4 yrs	FWS/SA	1.5	1.5	1.5	1.5	1.5	
I-3	Assess habitat requirements	3.1	2	3 yrs	FWS/SA/PO			0.5	0.5	0.5	
I-2 I-14	Research ecological role of river	3.2	2	5 yrs	FWS/SA/PO	0.5	0.5	0.5	0.5	0.5	
I-3 I-14	Assess historical river dynamics	3.3	3	2 yrs	FWS/PO		0.5	0.5			
I-14	Identify available habitat	3.4	2	3 yrs	SA	0.5	0.5	0.5			

B. IMPLEMENTATION SCHEDULE FOR JESUP'S MILK-VETCH (Continued)

General Category	Task	#	Priority	Duration	Agencies	Cost (in thousands)					Comments
						FY1	FY2	FY3	FY4	FY5	
I-1	Monitor existing population levels	4.1	1	annually	FWS/SA	8.5	8.5	8.5	8.5	8.5	
I-6	Conduct demographic studies	4.2	3	3 yrs	FWS/SA/PO	1.0	1.0	1.0			
I-7 I-14	Conduct life history studies	4.3	2	3 yrs	FWS/SA/PO		0.5	0.5	0.5		
I-1	Determine minimum viable population	4.4	2	3 yrs	FWS/SA/PO		0.5	0.5	0.5		
I-4 M-3	Develop and initiate management plans	5.0	3	3 yrs	SA/PO	0.25	0.25	0.25			
M-1	Propagate seeds	6.1	3	2 yrs	PO/FWS		1.0	1.0			
M-2 M-3	Establish and manage new populations	6.2	3	2 yrs	FWS/SA/PO				1.0	1.0	

**APPENDIX**

**COMMENTS AND RESPONSES**

# The Nature Conservancy

Eastern Regional Office  
294 Washington Street, Room 740  
Boston, Massachusetts 02108  
(617) 542-1908

August 7, 1989

Mr. Gordon E. Beckett  
U.S. Fish and Wildlife Service  
400 Ralph Pili Marketplace  
22 Bridge St.  
Concord, NH 03301-4901

Dear Mr. Beckett:

I am pleased to have this opportunity to comment on the Astragalus robbinsii var jesupi Draft Recovery Plan. I found the plan well written, complete, and almost entirely accurate. You should correct a statement on page 4 which says two populations are "extremely small". In fact, only one population (Sumner Falls) is extremely small (as shown in Table 1).

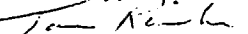
1. Comment noted, correction incorporated.

The need to learn more about riverbank vegetation is urgent, not only because of the critically rare Astragalus, but because riverbank habitats in general in the Northeast support a large proportion of the area's globally rare plant species (see my enclosed article: pages 24-25, The Nature Conservancy Magazine, September/October, 1988). What is learned from the Connecticut River could be applied to similar rivers in the region where rare plant conservation is needed.

I would encourage you to explore the technique of comparative studies with respect to the germination and future establishment of new Astragalus populations. Desmodium canadense is a native legume which occurs at the Claremont Astragalus site and elsewhere along the river. Establishing both the common Desmodium and the rare Astragalus at new sites will provide excellent insights. For instance, if the Desmodium establishes itself successfully, but the Astragalus does not, then we can conclude that our germination/transplanting technique was successful, and that for some reason, the Astragalus could not survive. If, on the other hand, we are unable to establish the common Desmodium and the Astragalus, we would have to reevaluate our techniques of transplanting/reintroduction.

Please let me know if I can be of any further assistance with Astragalus recovery. In particular, having seen all three populations and many, many riverbank sites along the Connecticut River, I might be able to suggest sites for Astragalus introduction. The best site for such an introduction that I know of is an area called "Silverweed Seep" located in NH about 0.4 mile north of the Hartland, VT site. At Silverweed Seep only a few rock outcrop microhabitats seem suitable.

Sincerely,

  
Thomas J. Rawinski,  
Regional Ecologist

cc. Frankie Brackley, N.H. Natural Heritage Inventory  
Liz Thompson, Vermont Natural Heritage Program



State of Vermont

Department of Fish and Wildlife  
Department of Forests, Parks and Recreation  
Department of Environmental Conservation  
State Geologist  
Natural Resources Conservation Council

AGENCY OF NATURAL RESOURCES  
103 South Main Street, 10 South  
Waterbury, Vermont 05676  
802-244-7331  
DEPARTMENT OF FISH AND WILDLIFE

14 September 1989

Gordon E. Beckett  
U.S. Fish & Wildlife Service  
400 Ralph Pill Marketplace  
22 Bridge St.  
Concord, NH 03301-4901

Dear Mr. Beckett:

1. The Vermont Fish & Wildlife Department supports the objectives and recovery actions of the Jesup's Milk-vetch Draft Recovery Plan. My only comment about the objectives is that the establishment of new populations does not seem to be given the committment it deserves. The wording "purely speculative, preliminary target" (p. 12) and "last-resort recovery alternative" (p. 19) give the impression that this action may not happen even if it is warranted. I suggest the wording be firmed up to indicate that the establishment of new populations is indeed an action that will take place if the other actions listed are insufficient.

2. Further, the determination (p. 12): "if it is ascertained that not enough habitat remains, or ever existed, to support a viable population--it will be determined that delisting or reclassification is not possible," does not explore the option of creating suitable habitat. Although I don't have the expertise to advise whether this is possible, I would suggest that information be placed into the plan to show this as an option. I am assuming that the seven additional populations for reestablishment would occur on unoccupied, available habitat.

In addition to this comment, I suggest that the following, current information be added:

3. 1) the Vermont Natural Heritage Program came under the auspices of our Department this month. The separate references to State Agencies and the VNHP on pages 22-24 are not accurate because VNHP is the state agency. I suggest reference be made only to the state agency, at least in Vermont. Also reference to VNHP on p. 6 as part of the Dept. of Forests, Parks and Recreation is outdated;

1. Comment noted, correction incorporated.

2. There is insufficient information on the biological requirements of Jesup's milk-vetch to determine whether creation of suitable habitat is a viable option at this time.

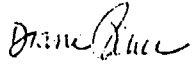
3. Comment noted, correction incorporated.



Page 2  
G.E. Beckett

4. { 2) Vermont now has a cooperative agreement for plants, signed this past spring, and I have requested Section 6 funds for Astragalus robbinsii var. jesupi for FY1990. The information on p. 14 should be changed to show this action.

Best Regards,



Diane Pence  
Nongame Biologist

4. Comment noted, correction incorporated.



State of Vermont

AGENCY OF NATURAL RESOURCES

103 So. Main St.  
Center Building  
Waterbury, Vermont 05676

OFFICE OF THE SECRETARY

Department of Fish and Wildlife  
Department of Forests, Parks, and Recreation  
Department of Environmental Conservation  
State Geologist  
Natural Resources Conservation Council

VERMONT NATURAL HERITAGE PROGRAM

September 26, 1989

Susie VonOttingen  
U.S. Fish and Wildlife Service  
400 Ralph Pill Marketplace  
22 Bridge Street  
Concord, NH 03301-4901

Dear Susie,

I would like to comment on the draft recovery plan for Astragalus robbinsii var. jesupi, prepared by Frankie Brackley. Thanks for your patience in waiting for my comments; I hope they are helpful.

The plan is very good, and covers all the necessary and possible strategies for ensuring survival of the taxon. I have only a few minor editorial comments on the first section, and some more substantive editorial comments on the second.

Part I - Introduction

Page 1, last sentence should read "The diagnostic seed pod is 1.5 cm to 3.0 cm long and has a conspicuous beak."

Page 3, line 4 should read: "and its name was published..."

Page 3, line 5: comma after "Hartland"

Page 4, par. B, line 4 should read "Of these three extant populations, one is extremely small."

Page 6, first full par., line 3 and 4 should read: "(Vermont Agency of Natural Resources)"

Page 7, par. D., line 7, replace "prime" with "largest"

Page 7, par. D. lines 8-9 should read "A list of the species most commonly associated with..." ("dominant" has a specific meaning which is not the intended meaning here).

1. Comments noted, corrections incorporated.

2. Page 8, Table 2. Header should read "Species most commonly associated with Jesup's milk-vetch"
- Page 11, end of first full par., add the following sentence:  
"Jesup's milk-vetch is protected under both laws."

### Part II - Recovery

This section is somewhat confusing to me. I am not aware what the official meaning of the word "recovery" is, but it appears that, at least in this case, recovery has two aspects: 1) maintenance of the present population and 2) artificially increasing the population size so that it reaches some acceptable level. If I understand it correctly, then some things need to be clarified in the text:

3. Page 12 - "A. Recovery Objectives" - plural.
- Page 12, par. 1: "The primary, short-term objective..."
- Page 12, par. 2 might read like this: "A secondary, long-term objective of the program is to increase the size of the total population of Jesup's milk-vetch to a level which will ensure long-term survival of the species. This ideal total population size is as yet undetermined." (In other words, the gathering of information is not really a recovery objective, but only a necessary prerequisite.)
4. Page 12, par. 3: Is reclassification a recovery objective? If so, list it as the third objective. Otherwise delete the paragraph.
5. Page 12, par. 4. If it is desired that we determine the minimum population size necessary to maintain the taxon, then speculation as to the results of that investigation is inappropriate. Leave this paragraph out. It is confusing and misleading.
6. Page 13 and onward: All of Section B needs to be organized to reflect the organization of Section A. In other words, if there are two recovery objectives, then the actions should come in two categories. Section B should be titled; "Narrative Outline for Recovery Actions". Subsection 1 should be as it is, "Protect Known Populations" and Subsection 2 should address establishment of new populations in several steps: a) determine minimum population size necessary for long-term survival; b) inventory suitable habitat to locate other populations; c) study habitat and determine ecological requirements; and d) establish a reintroduction program if it is determined to be necessary. The development of management plans comes under both 1 and 2.
- As to the details of the writing in this section:
7. Page 13, par. 1.1: "such agreements are pending with the other two landowners" - is this really true are are we just hoping for such agreements?

2. Comments noted, correction incorporated.

3. The differentiation of objectives into short-term and long-term objectives is not standard method for treating the means to recovery of an endangered species. The primary, immediate objective of any recovery plan is the prevention of extinction of the species in question. The comment regarding information gathering as an objective has been noted and incorporated.

4. Reclassification and/or delisting is the understood goal of all recovery plans. Should the objectives of the Recovery Plan be met, reclassification would be in order.

5. The National Recovery Planning Guidelines require quantitative objectives. Should information arise determining that it is not possible to establish additional populations of Jesup's milk-vetch, the objective will be revised.

6. Many tasks are dependent upon the completion of preceding tasks and are interrelated, and relate to both objectives. The authors believe that the organization of Section B. sufficiently relates to the objectives and does not need further revision.

7. The sentence was too optimistically worded and has been corrected.

Page 15 indent 1.4

Page 16, line 4: replace "var. jesupi" with either "Jesup's milk-vetch" or "Astragalus robbinsii var. jesupi".

Page 16, par. 3.2, last line: what other environmental parameters?

Page 17, first two lines: What does this mean? As it reads, it implies that the building of dams led to the discovery of Jesup's milk-vetch. Is that what is intended here?

Page 17, par. 3.4, line 3: replace "will" with "should" in both cases for consistency. Line 4: replace "overall" with "total quantity of"

Page 18, par. 4.4: entitle paragraph "Determine minimum population size for long-term survival of the taxon" (I understand that this concept is a difficult thing to put into words!). The overall area available for potential use should not be a factor in making this determination (although it will be a factor in determining whether the minimum population size can actually be attained).

I hope these comments make sense and are of some use. Please contact me if you have any questions. I am very pleased to see that some action is being taken to protect this very rare and endangered member of our flora!

Sincerely,



Elizabeth Thompson  
Plant Ecologist

cc: Chris Fichtel, Coordinator, VNHP  
Diane Pence, Vermont Fish and Wildlife Department  
Frankie Brackley, New Hampshire Natural Heritage Inventory  
Tom Rawinski, Eastern Heritage Task Force, TNC

8. Comments noted and corrections incorporated.

9. The definition of minimum viable population has been incorporated into the text, this should clarify the concept expressed in part 4.4.

# UNIVERSITY OF NEW HAMPSHIRE

Department of Botany and Plant Pathology  
College of Life Sciences and Agriculture  
Nesmith Hall  
Durham, New Hampshire 03824-3597  
(603) 862-\_\_\_\_\_

28 August 1989

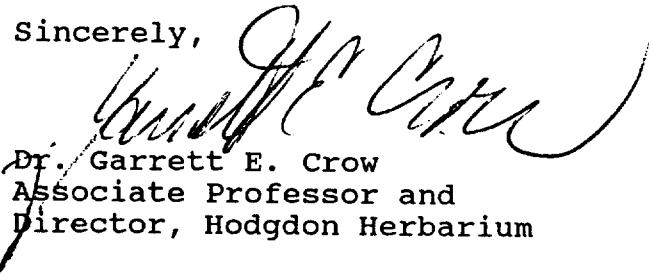
Ms. Susi von Oettinger  
USFWS  
22 Bridge St.  
Concord, NH 03301

Dear Ms. von Oettinger:

I am writing concerning the draft recovery plan for Jesup's Milk-Vetch (Astragalus robbinsii var. jesupi) sent to me for review by your office.

I would like to endorse the Recovery Plan as drafted. The plan is well thought out and well written. I believe it gives us an excellent starting point for addressing the concerns involved for this endangered species.

Sincerely,



Dr. Garrett E. Crow  
Associate Professor and  
Director, Hodgdon Herbarium

AUG 31 1989